

# Rocky Flats Environmental Technology Site

PRO-478-RSP-16.04

REVISION 1

## RADIOLOGICAL SURVEY/SAMPLE DATA QUALITY ANALYSIS FOR FINAL STATUS SURVEY

Responsible K-H Org Radiation Protection Effective Date 5/22/01Approved By Manager / Radiation Protection / 4/6/01  
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Print Name of Responsible Manager (N/A if RM is Approval Authority)

THE RESPONSIBLE MANAGER HAS DETERMINED THAT THE FOLLOWING ORGANIZATIONS' REVIEW/CONCURRENCE IS REQUIRED. REVIEW/CONCURRENCE DOCUMENTATION IS CONTAINED IN THE PROCEDURE HISTORY FILE

KH Analytical Services Division	371/374 Closure Project
KH D&D Advance Planning	707 Closure Project
KH Quality Assurance	771 Closure Project
KH Radiological Engineering	776/777 Closure Project
Material Stewardship and Offsite Shipment Project	Engineering, Environmental, Safety, & Quality Programs
Remediation, Industrial Building D&D, & Site Services Project	

### IMPORTANT NOTES

ISR Review SISRC 01-13

SES/USQD Review SES-RFP-01 0792-MAW

Periodic Review Frequency 4 years from the effective date

This document supersedes PRO-478-RSP-16 04, Revision 0

PADC-1999-02618



REVIEWED FOR CLASSIFICATION/UCNI

by J. Matheson, Sr. AnalystDate 05-15-01

Approved for Public Release

ADMIN RECORD  
SW-A-004751

**LIST OF EFFECTIVE PAGES**

<u>Pages</u>	<u>Effective Date</u>	<u>Pages</u>	<u>Effective Date</u>
1-26	05/22/01		

Total number of pages 26

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The following changes are active for this document

None

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## 1. PURPOSE

This procedure is performed following data collection to verify, validate and evaluate the quality of the Pre-Demolition Survey (PDS) data

This procedure demonstrates the methods by which radiological surveys and samples meet the quality control (QC) criteria described in NUREG-1575, Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM). It is applicable during implementation of final status surveys (FSS) to collect and evaluate survey results in accordance with the Site Pre-Demolition Survey Plan (PDSP). It supports the Decommissioning Program Plan (DPP) by implementing criteria that will provide sufficient data to demonstrate that the Site has successfully completed decommissioning in conformance with the governing Rocky Flats Cleanup Agreement (RFCA) decision document. It implements the Data Quality Objectives as described in the MAN-076-FDPM, Facility Disposition Program Manual (FDPM). It additionally incorporates or references program criteria from the MAN-102-SRCM, Rocky Flats Environmental Technology Site Radiological Control Manual (Site RCM), 10 Code of Federal Regulations (CFR) 835, Occupational Radiation Protection, and 10 CFR 830.120, Quality Assurance Requirements.

Data Quality Assessment (DQA) will be applied to all PDS data in order to

- Decrease the probability of making an incorrect decision and help the data user understand the level of uncertainty that surrounds the decision
- Provide an estimate of the uncertainty associated with the survey/sample data

For any survey/sample that will be used as part of a Pre-Demolition Survey (PDS), the QC measurements will be assessed via the same DQA process.

## 2. SCOPE

This procedure applies to D&D Radiological Engineers who perform Data Quality Assessment in support of PDS activities.

Data Quality Assessment is a scientific and statistical evaluation that determines if the data is of the right type, quality, and quantity to support its intended use. All data that supports a Data Quality Objective (DQO) should be checked for Precision, Accuracy, Representativeness, Completeness, and Comparability (PARCC) as detailed in Section 7. Measurement data will first be verified to ensure that the procedures and survey package instructions were followed as intended and that the measurement systems performed in accordance with the design criteria. This data is then validated to ensure that the results of the data collection activities support the objectives of the survey. The DQA process is then applied using the validated data to determine whether the quality of the data is

sufficient to determine compliance with the derived concentration guideline level (DCGL)

This revision supersedes PRO-478-RSP-16 04, Revision 0

### **3. RESPONSIBILITIES**

#### **3.1 Radiological Engineering Manager or Radiological Safety Manager**

Administers this procedure

Reviews and signs Survey Package Cover Sheet (see PRO-475-RSP-16 01) indicating that the radiological survey/sampling efforts meet the project DQOs and the package is ready for closure

#### **3.2 Radiological Engineer (RE)**

Ensures that survey plan objectives have been met as specified

Performs inspections to judge procedural compliance, assessments to determine process effectiveness, and technical reviews to ensure efforts are meeting quantifiable DQOs

Reviews radiological instrumentation records and radiological survey results

Recommends corrective action, investigation, remediation, or other type of survey for a survey unit if required

Performs the DQA in accordance with this procedure

Provides turnover to a RE reviewer for peer review

Updates Survey Package Tracking Form (see PRO-475-RSP-16 01) upon radiological survey/sampling package closure

Prepares reports (RLC and/or FSS)

#### **3.3 Radiological Engineering Reviewer (i.e. Peer Review)**

Reviews and signs Survey Package Cover Sheet (see PRO-475-RSP-16 01) to indicate that the radiological survey/sampling package is ready for closure

Performs the DQA peer review

#### 4. GLOSSARY

##### 4.1 Acronyms

ASD	Analytical Services Division
cpm	Counts Per Minute
D&D	Decontamination and Decommissioning
DCGL <sub>w</sub>	Derived Concentration Guideline Level-Wilcoxon Rank Sum test
DCGL <sub>EMC</sub>	Derived Concentration Guideline Level-Elevated Measurement Comparison
DOE	U S Department of Energy
dpm	Disintegration Per Minute, reporting unit for field measurements
DQA	Data Quality Assessment
DQI	Data Quality Indicators, i e , PARCC parameters
DQO	Data Quality Objectives
EPA	U S Environmental Protection Agency
FDPM	Facility Disposition Program Manual
FSS	Final Status Survey (equivalent to Pre Demolition Survey or PDS)
FSSP	Final Status Survey Plan
FSSR	Final Status Survey Report
HSA	Historical Site Assessment
IPC	In-Process Characterization
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDA	Minimum Detectable Activity
MDC	Minimum Detectable Concentration
NORM	Naturally Occurring Radioactive Material
PARCC	Precision, Accuracy, Representativeness, Completeness, and Comparability
PDS	Pre Demolition Survey (equivalent to Final Status Survey or FSS)
QA/QC	Quality Assurance/Quality Control
RCT	Radiological Control Technician
RE	Radiological Engineer
RCTTS	Radiological Control Technician Technical Supervisor
RFETS	Rocky Flats Environmental Technology Site
RLC	Reconnaissance Level Characterization
RLCP	Reconnaissance Level Characterization Plan
RPD	Relative Percent Difference, precision
RLCR	Reconnaissance Level Characterization Report
V&V	Verification and Validation

##### 4.2 Definitions

**Accuracy** – A measure of the closeness of an individual measurement or the average of a number of measurements to the true value To be accurate, data must be both precise and unbiased

**Bias** – The systematic or persistent distortion of a measurement process that causes errors in one direction. Systematic errors (bias) accumulate during the measurement process and result from faults in sampling designs and procedures, analytical procedures, sample contamination, losses, interactions with containers, deterioration, inaccurate instrument calibration, and other sources. Bias causes the mean value of the sample data to be consistently higher or lower than the true mean value.

**Completeness** – A measure of the amount of valid data obtained from the measurement system, expressed as a percentage of the number of valid measurements that should have been collected (i.e., measurements that were planned to be collected).

**Comparability** – The qualitative term that expresses the confidence that two or more data sets can contribute to a common analysis and interpretation. Comparability is not compromised provided that the survey design is unbiased, and the survey design or analytical methods are not changed over time.

**DCGL<sub>w</sub>** – Derived Concentration Guideline Level - Contamination limit based on the assumption that the concentration of residual activity is evenly distributed over a large area.

**DCGL<sub>EMC</sub>** – Derived Concentration Guideline Level - Contamination limit based on the assumption that the concentration of residual activity is distributed as small-elevated areas within a larger area.

**Data Quality Assessment (DQA)** – A scientific and statistical evaluation that determines if the data is of the right type, quality, and quantity to support its intended use.

**Data Quality Objectives (DQOs)** – DQOs are qualitative and quantitative statements derived from the design process. They clarify technical and quality objectives, define the appropriate type of data, and specify levels of decision error that will be used as the basis for establishing the quality and quantity of data necessary to support facility disposition decisions.

**Facility** – Any equipment, structure, system, process, or activity that fulfills a specific purpose. For the purpose of this procedure, facility is expanded to include any formally designated building, site, structure, area, or project where a formal work authorization must be granted prior to conducting work.

**Final Survey** – Radiological measurements, evaluations and support activities undertaken to demonstrate that a facility satisfies the criteria for unrestricted use.

**Final Survey Report** – A report describing the methods and results of the Final Survey. The Final Survey Report initiates the final review and inspection of a facility for unrestricted release.

**Impacted Class 1 Areas** – Areas that have, or had prior to remediation, a potential for radioactive contamination (based on site operating history) or known contamination (based on previous radiation surveys) above the DCGL<sub>w</sub>. Examples of Class 1 areas include 1) site areas previously subjected to remedial actions, 2) locations where leaks or spills are known to have occurred, 3) former burial or disposal sites, 4) waste storage sites, and 5) areas with contaminants in discrete solid pieces of material and high specific activity

**Impacted Class 2 Areas** – Areas that have, or had prior to remediation, a potential for radioactive contamination or known contamination, but are not expected to exceed the DCGL<sub>w</sub>. To justify changing the classification from Class 1 to Class 2, there should be measurement data that provides a high degree of confidence that no individual measurement would exceed the DCGL<sub>w</sub>. Other justifications for reclassifying an area as Class 2 may be appropriate based on site-specific considerations. Examples of areas that might be classified as Class 2 for the final status survey include 1) locations where radioactive materials were present in an unsealed form, 2) potentially contaminated transport routes, 3) areas downwind from stack release points, 4) upper walls and ceilings of buildings or rooms subjected to airborne radioactivity, 5) areas handling low concentrations of radioactive materials, and 6) areas on the perimeter of former contamination control areas

**Impacted Class 3 Areas** – Any impacted areas that are not expected to contain any residual radioactivity, or are expected to contain levels of residual radioactivity at a small fraction of the DCGL<sub>w</sub>, based on site operating history and previous radiation surveys. Examples of areas that might be classified as Class 3 include buffer zones around Class 1 or Class 2 areas and areas with very low potential for residual contamination but insufficient information to justify a non-impacted classification

**Judgmental Survey** – Surveys that are performed at locations selected using professional judgment based on unusual appearance, location relative to known contamination areas, high potential for residual radioactivity (e.g., horizontal surfaces, high traffic areas, corners, drains), general supplemental information, etc

**Local Area Background** – Background survey instrument readings taken at specific locations within a survey unit in order to determine actual contamination values in a more precise manner

**Measurement Location** – A survey location where a typical set of total surface contamination and removable contamination activity measurements are obtained

**Minimum Detectable Activity** – The minimum amount of activity that can be statistically detected above background with a 95% probability and with a maximum of 5% probability of falsely interpreting sample activity due to background



**Non-Impacted Areas** – All areas not classified as Impacted Class 1, Impacted Class 2 or Impacted Class 3. These areas are areas where there is no reasonable potential for residual contamination, based on knowledge of building history and/or previous survey information. Sufficient information is present to be assured that no residual contamination is present above the applicable contamination limits.

**Outlier** – Measurements that are unusually large or small relative to the rest and therefore are suspected of misrepresenting the population from which they were collected.

**Precision** – A measure of agreement among replicate measurements of the same property under prescribed similar conditions. Calculated as the Relative Percent Difference or the Duplicate Error Ratio.

**Remediation** – Activities conducted to reduce potential risks to people and/or harm to the environment from radioactive and/or hazardous substance contamination.

**Representativeness** – A measure of the degree to which data accurately and precisely represent a characteristic of a population parameter at a sampling point or for a process condition or environmental condition. Representativeness is a qualitative term that should be evaluated to determine whether survey/sample measurements are collected in such a manner that the resulting data appropriately reflects the media and contamination measured. Representativeness is determined by examining the survey plan.

**Sample** – A quantifiable amount of a given media, normally intended to represent a specific location or a larger volume of the same media surrounding the sample location.

**Survey** – Field measurements, to determine contamination levels and contamination characteristics of a specified area.

**Survey Area** – The most general category, comprised of surfaces to be further defined as one or more survey units, the bounds of which are defined by existing physical features such as walls, columns, beams etc.

**Survey Design** – The process of determining the type, location, number and density of radiological measurements to be taken for a RLC or final status survey.

**Survey Instructions** – Written instructions which specify the type and number of measurements to be taken in a survey area or survey unit. Each survey package shall include survey instructions.

**Survey Package** – A collection of information in a standardized format for controlling and documenting field measurements taken for a RLC or final status survey. A survey package is prepared for each Survey Unit. The survey package typically includes the survey instructions, survey data sheets and grid maps.

**Survey Point** – A smaller subdivision within an area or unit designated as a survey location where measurements are obtained. This area generally refers to the area covered by a detector probe or 100 cm<sup>2</sup> when a smear is obtained.

**Survey Unit** – A contiguous area with similar characteristics and contamination potential. Survey units are established to facilitate the process and aid in the statistical evaluation of the survey data. As a general rule a survey unit is a subset of a survey area.

**Type 1 Building** – Building free of DOE controlled radioactive contamination.

**Type 2 Building** – Buildings without significant DOE controlled radioactive contamination or hazards, but in need of decontamination.

**Type 3 Building** – Buildings with significant DOE controlled radioactive contamination and/or hazards.

## 5. TRAINING REQUIREMENTS

Individuals implementing this procedure shall

- Have satisfactorily completed the Radiological Engineers for Radiological Control Entry Level Qualification card
- Be trained in the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), formally as defined by the Radiological Training Department or informally via RE qualification as delineated above.

This training shall be complemented by participation in structured activities such as walkdowns, planning meetings, and development of work plans or packages that are distributed for peer review to ensure adequate understanding of the principles and practices entailed.

## 6. PREREQUISITE ACTIONS

### 6.1 Performance Documents

#### RE

- [1] Ensure that all required data is present and properly recorded in the package before starting V&V calculations.

Required forms include, but are not limited to

- All survey/sample data applicable to the unit, (include Analytical Services Division (ASD) data)
- All instrument calibration data applicable to the unit, (include ASD data)
- All instrument performance and trending data applicable to the unit, (include ASD data)

- Survey Package Sign-Out Form (see PRO-475-RSP-16 01)
- Survey Unit Breakdown Form (see PRO-475-RSP-16 01)
- Survey Package Cover Sheet (see PRO-475-RSP-16 01)
- Survey Package Correction/Change History Form (see PRO-475-RSP-16 01)
- Survey Package Survey/Sampling Instructions Form (see PRO-475-RSP-16 01)
- Survey Package Calculation Worksheet (see PRO-475-RSP-16 01), if required
- Total Surface Activity Data Sheet (see PRO-476-RSP-16 02)
- Removable Activity Data Sheet (see PRO-476-RSP-16 02)
- Instrument Data Sheet (see PRO-476-RSP-16 02)
- Survey Signature Sheet (see PRO-476-RSP-16 02)
- Surface Media Data Form (see PRO-477-RSP-16 03), if media samples are required
- Sample Chain-of-Custody (COC) Form, if media samples are required
- Survey Map
- Other documents as RE and/or Project Management direct

Also included with the Survey package is the Package Content Sheet (see Appendix 4) This sheet provides a table contents outline of the survey package documentation

## 7. INSTRUCTIONS

### 7.1 Data Verification

#### RE

- [1] Review the survey unit data

- [A] Ensure that the requirements that are stated in the planning documents have been implemented as prescribed
- [B] Ensure actual data measurements are reported, even though negative numbers may result
  - [a] Correct deficiencies, if necessary, through resurveying or resampling
- [C] Verify that deficiencies or problems that occurred during implementation have been reported and thoroughly documented

Activities performed during the implementation phase are regularly assessed by the RE with findings reported to management. Any deficiencies noted or corrective actions taken should be technically reviewed by the RE and approved by project management. Self-assessments may be, and independent assessments must be, scheduled and performed as part of the PDS process. Monthly written reports are recommended as a minimum.

**NOTE** *Data points containing transcription error, must be corrected, initialed and dated whereas data points collected while an instrument was malfunctioning may be discarded*

- [D] Verify that in all instances where data is reanalyzed or reacquired, the new measurements also meet the criteria of this procedure
- [2] Review the control charts and instrument/measurement system performance documentation and identify omissions or conditions requiring corrective actions
- [3] Specify the status of any outliers or anomalies present in the data set
- [4] IF an outlier is discarded from the data set,  
THEN justification must be provided in the survey package or report

This decision should be based on professional judgment in addition to the results of statistical tests. If scientific reasoning does not explain the outlier, it should not be discarded from the data set. Never discard an outlier based solely on a statistical test.

[5] Review any corrective actions for adequacy and appropriateness

[6] IF any data points are discarded,  
THEN

- Document in the survey package each data point
- Perform Statistical test
- Provide Reason for discarding each data point, and
- Identify Effect on the analysis of deleting the data points

This information is critical for effective peer review

## 7.2 Data Validation

The principal Data Quality Indicators used at RFETS are Precision, Accuracy, Representativeness, Comparability, Completeness (PARCC), and Sensitivity Bias is discussed within the Accuracy subsection

**NOTE** *As with all components of a successful survey, the level of effort associated with the assessment of survey data should be consistent with the objectives of the survey (i.e., a graded approach)*

### 7.2.1 Precision

RE

[1] Assess in a qualitative fashion the precision for field data (total and removable surface activity measurements)

Duplicate/replicate data will be evaluated for repeatability with respect to the DCGL<sub>W</sub> (i.e., QC data must be less than the DCGL<sub>W</sub> if the original result was less than the DCGL<sub>W</sub>)

**NOTE** *Field background measurements can also be plotted on a control chart to estimate bias caused by contamination of the instrument*

### Total and Removable Activity Surveys, and Scans

[2] Demonstrate Repeatability for total activity measurements through instrument performance checks

[3] Review instrument performance check as plotted on control charts to track instrument performance over the course of the survey

Bias shall also be evaluated based on "runs" ( $\geq 7$  consecutive points above or below the centerline), trends ( $\geq 5$  consecutive points in upward or downward direction), or other unnatural patterns of variability in the data

## 7.2.2 Accuracy

### RE

#### Total Activity Survey and Scans

**NOTE** *Field background measurements can be plotted to estimate bias caused by contamination of the instrument, if this is deemed necessary*

- [1] Note the applicable bias range ( $\pm 20\%$  of Source Activity) allowed for each instrument (3-PRO-112-RSP-02 01, RSFORMS 02 01-02 & 04) used and verify that the instrument(s) response is  $\pm 20\%$  of Source Activity

This can be accomplished by verifying the results on the Performance Test Log(s) or control charts

- [2] Determine if bias exists by reviewing trends on instrument control charts
- [3] Record the results as Survey Accuracy on the DQA Checklist (see Appendix 1)

#### Surface Media Samples

- [4] Obtain documentation of the laboratory sample analysis

This documentation must match the specifications in the survey design

- [5] Review the provided analytical data [particularly the case narrative(s)] and record the proper data for Sample Accuracy on the DQA Checklist (see Appendix 1)

ASD personnel should be available to assist with data verification and validation

- [6] Verify that all sample(s) Chain(s) of Custody are present and contain no lapses
- [7] Record the name of the laboratory supplying the data

- [8] IF a large portion of the data is rejected,  
OR if all data from one or more survey units are rejected,  
THEN have samples reanalyzed or have the affected survey unit(s) resurveyed or reanalyzed

### 7.2.3 Representativeness

#### RE

- [1] Compare the survey/sampling plan to the survey/sampling results  
  
Representativeness is part of the survey design process and the resulting data should match
- [2] Review the Survey Package Survey Map
  - [A] Look for areas with high or low concentrations of measurements
  - [B] Determine the reasoning behind judgmental decisions in classifying survey units
  - [C] Ensure random survey/sample pattern is consistent with the data package and the survey map
- [3] Resolve any discrepancies between the survey plan and the survey data or any changes between units of analytical or survey method
- [4] Record acceptance of representativeness on the DQA Checklist (see Appendix 1)
  - [A] Annotate and include any explanatory comments

### 7.2.4 Completeness

#### RE

- [1] Calculate completeness for the survey/sample using the following formula
$$\text{Completeness} = \frac{\text{Number of Valid Measurements}}{\text{Total Number of Measurements Planned}} \times 100$$
- [2] Record the applicable percentage as Survey/Sample Completeness on the DQA Checklist (see Appendix 1)
- [3] IF the ratio of usable data to required data is <0.80 (based on MARSSIM guidance for the calculated number of random measurements),  
OR the unusable data is crucial to the survey,  
THEN have samples reanalyzed or have the affected survey/sample unit(s) resurveyed/resampled

### 7.2.5 Comparability

#### RE

- [1] Compare the survey/sampling plan to the survey/sampling results

[A] Compare the unit data with other associated units

If each unit follows the Survey/Sampling Plan, comparability should be near optimum

[B] Document any changes noted

[2] Ensure that procedural and/or instrumentation changes within the project life cycle do not compromise survey/sample/scan data comparability

[3] Indicate acceptance of data comparability in the space provided on the DQA Checklist (see Appendix 1)

### 7.3 Data Quality Assessment (DQA)

#### RE

[1] Examine the data to determine whether any activity measurement exceeds the average activity concentration limit, DCGL<sub>w</sub>

[2] Calculate the mean and standard deviation of the survey/sample activity

[3] Record the results on the DQA Checklist (see Appendix 1)

[4] IF NO activity measurement exceeds the DCGL<sub>w</sub>,  
AND the survey unit meets the release criteria,  
THEN go to Section 8 because no further analyses are required

[5] IF the MEAN exceeds DCGL<sub>w</sub>,  
THEN complete Section 7 4 because the survey unit does NOT meet the release criteria

NOTE *DCGL<sub>EMC</sub> does not apply to removable contamination survey measurements*

[6] IF any measurement exceeds the maximum limit, DCGL<sub>EMC</sub>,  
THEN complete section 7 4 because the survey unit does NOT meet the release criteria

[7] IF any measurement exceeds the DCGL<sub>w</sub>, but is less than the DCGL<sub>EMC</sub>,  
THEN perform the statistical test

[A] Refer to Appendix 3 for guidance on performing the sign test

[B] IF an alternate statistical design is utilized,  
THEN perform the appropriate statistical test and document in the survey package



- [8] IF any measurement exceeds the  $DCGL_w$ , but is less than the  $DCGL_{EMC}$ ,  
AND if compliance with the square meter average requirements in DOE Order  
5400.5 must be demonstrated,  
THEN eight (8) additional measurements must be collected in the square meter to  
prove the average is less than the  $DCGL_w$
- [9] IF the null hypothesis is rejected (i.e., conclude that the mean concentration of  
residual radioactivity in the survey unit is less than the  $DCGL_w$ ),  
THEN the survey unit meets the release criteria
- [10] IF the null hypothesis is NOT rejected (i.e., conclude that the mean concentration  
of residual radioactivity in the survey unit is greater than the  $DCGL_w$ ),  
THEN the survey unit does not meet the release criteria

#### 7.4 Evaluation

##### RE

- [1] IF release criteria have NOT been met,  
THEN
- [A] Evaluate whether the survey unit should be reclassified based on the  
following criteria
- Review and confirm the data that led to the decision
  - Determine the level and extent of residual radioactivity
  - Determine if the assumptions of the test were correct (e.g., descriptive  
statistics)
  - Determine whether additional surveying or decontamination is  
required
- [B] If additional surveying is required (e.g., increasing scan coverage to 100  
percent), generate the necessary survey package, redefining survey units as  
necessary

**NOTE** *Data quality must be acceptable, based on Quality Assurance criteria  
(covered by this RSP), before a survey unit is subject to unrestricted  
release*

- [2] Document all actions in the survey package, including filing a copy of any RIRs  
generated

## **8 POST-PERFORMANCE ACTIVITY**

### **8.1 Documentation**

Documentation of the final status survey should provide a clear, complete record of the radiological status of the survey unit, relative to the established DCGLs. In addition, sufficient data and information should be provided to enable an independent re-creation and evaluation. To the extent practicable, this data package should be a stand-alone document with minimum information incorporated by reference. The package will be independently reviewed by organizations other than Radiological Engineering.

#### **RE**

- [1] Summarize all actions taken and the justification to show that the Data Quality Objectives were achieved
- [2] Report any additional data, remediation, or reanalysis or resurvey required resolving discrepancies or deficiencies
- [3] Ensure the DQA Checklist (see Appendix 1) is completed

### **8.2 Data Reporting**

#### **RE**

- [1] Generate a Final Report to summarize the data for given buildings/clusters or portions thereof

The report should contain a concise and organized data summary for each type of data. Individual sections should be developed to discuss the results for each data type as outlined below (results in each section should be subdivided by survey unit)

- 1 Total Surface Activity results
- 2 Removable Surface Activity results
- 3 Media Sample results
- 4 Scan results

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## 9. RECORDS PROCESSING INSTRUCTIONS

The following documents are handled or initiated during performance of the activities described in this procedure

Record Identification	Record Type	Protection/Storage	Processing Instructions
In process Other supporting documents <sup>1</sup>	QA Record	Responsible Manager SHALL implement a reasonable level of protection for in-process QA records to prevent loss or degradation. Records SHALL be stored in standard office filing systems.	Continued prescribed processing of documents. Upon completion of processing, approval and authentication records will be transmitted to appropriate Records Center (e.g., Project Records) in accordance with 1-V41-RM-001, Records Management Guidance for Records Sources.
DQA Checklist (Appendix 1)	Non Record	None	Destroy when no longer needed.
Completed Forms and documents as identified above	QA Record	Responsible Manager shall implement a reasonable level of protection for QA records to prevent loss or degradation in conjunction with Site Records Management organization to assure reasonable level of controls are being implemented.	When inactive, as defined in 1-V41-RM-001, Records Management Guidance for Records Sources, transfer to Site Records Management for archiving in accordance with 1-V41-RM-001.

<sup>1</sup> Supporting documents such as RIRs, contamination and radiation surveys, etc. are handled and processed in accordance with established procedures.

## 10. REFERENCES

The following documents are either directly referenced or used in the development of this procedure:

AME TAD PPP 02637, Application of Surface Contamination Guidelines from DOE Order 5400.5

ANSI N323, American National Standard Radiation Protection Instrumentation Test and Calibration, Portable Survey Instruments

CAS SOP-003, Sampling for Waste Characterization

Decommissioning Program Plan

DOE Order 5400 5, Radiation Protection of the Public and Environment

GR01, General Laboratory Requirements

Health Physics Instrumentation (HPI) Manual

MAN-076-FDPM, Facility Disposition Program Manual

MAN-102-SRCM, Rocky Flats Environmental Technology Site Radiological Control Manual (Site RCM)

MAN-127-PDSP, Pre-Demolition Survey Plan (also referred to as Site PDSP)

NUREG-1575, Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)

PRO-475-RSP-16 01, Radiological Survey/Sampling Package Design, Preparation, Control, Implementation and Closure

PRO-476-RSP-16 02, Pre-Demolition (Final Status) Radiological Surveys of Surfaces and Structures

PRO-477-RSP-16 03, Radiological Samples of Building Media

PRO-480-RSP-16 06, Radiological Background Determination

Rocky Flats Cleanup Agreement (RFCA)

RF/RMRS-98-200, Evaluation of Data for Usability in Final Reports

1-V41-RM-001, Records Management Guidance for Records Sources

3-PRO-112-RSP-02 01, Radiological Instrumentation

3-PRO-165-RSP-07 02, Contamination Monitoring Requirements

10 CFR 830 120, Quality Assurance Requirements

10 CFR 835, Occupational Radiation Protection

**APPENDIX 1**

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**DQA Checklist**

Survey Area.		Survey Unit:	Building.
Survey Area/Unit Description:			
§	Item	Performed By (Initials/Date)	Comments (number & attach)
7 1	<b>Data Verification</b>		
7 1[1]	Reviewed survey unit data		
7 1[2]	Reviewed control charts and performance logs		
7 1[3],[4], [5], [6]	Outliers / anomalies addressed		
7 2	<b>Data Validation</b>		
7 2 1	Survey/Sample Precision		
7 2 2	Survey/Sample Accuracy		
7 2 3	Representativeness		
7 2 4	Completeness		
7 2 5	Comparability		
7 3	<b>Data Quality Assessment (DQA)</b>		
7 3[2]	Calculate mean and standard deviation		
7 3[4]	Any measurement > DCGL <sub>w</sub> ?		
7 3[5]	Mean > DCGL <sub>w</sub> ?		
7 3 [6]	Any measurement > DCGL <sub>EMC</sub>		
7 3 [7]	Any measurement > DCGL <sub>w</sub> and < DCGL <sub>EMC</sub>		
7 3 [9]	If null hypothesis is rejected?		

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**APPENDIX 1**

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**DQA Checklist (continued)**

<b>§</b>	<b>Item</b>	<b>Performed By (Initials/Date)</b>	<b>Comments (number &amp; attach)</b>
7 4	Evaluation		
7 4[1][B]	New survey package (if req'd)		
7 4[2]	Radiological Improvement report (if req'd)		
7 4[2]	Verify documentation complete		
8 1	Documentation		
8 1[3]	DQA Checklist complete		
8 1	Independent/Peer review		

NOTE The DQA Flow Chart (Appendix 2) is provided as aid to illustrate the DQA process when performing survey/sample data analysis activities describe in this procedure

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**APPENDIX 2**

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**DQA FLOW CHART**

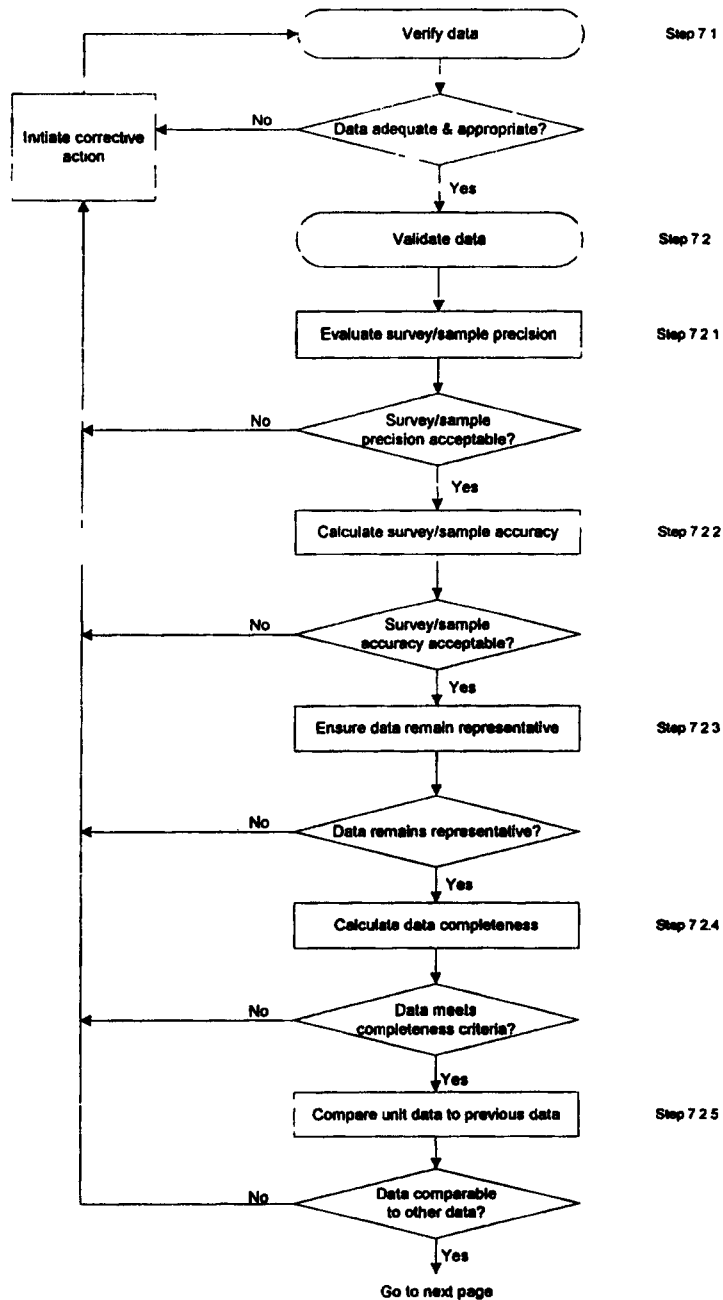


Figure 1 DQA flow chart (1 of 2)

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**APPENDIX 2**

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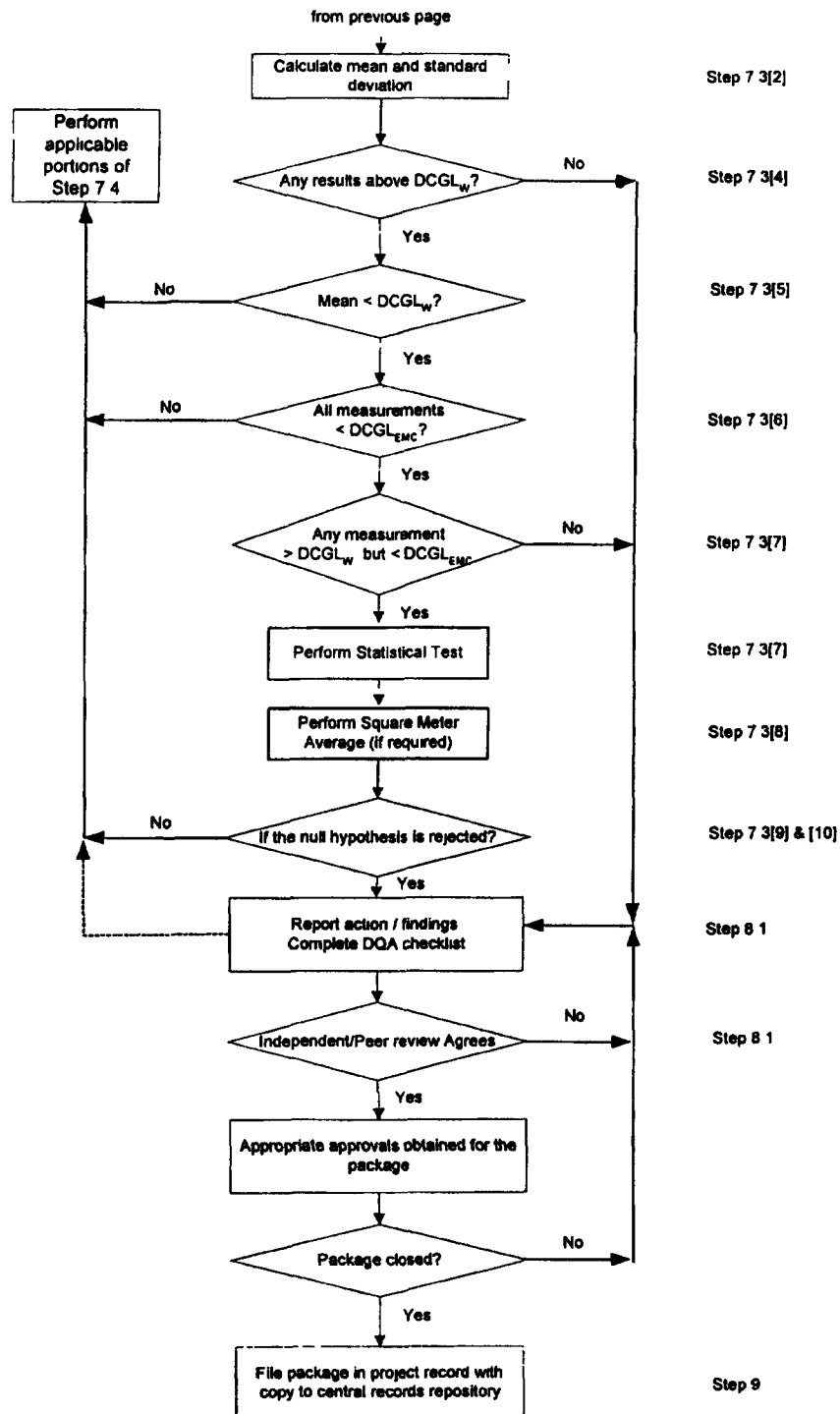


Figure 1 DQA flow chart (2 of 2)

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**APPENDIX 3**

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**APPLYING THE SIGN TEST**

- 1 List the survey unit net measurement results (i.e., local area and material background should be subtracted from each gross result),  $X_i$ ,  $i = 1, 2, 3, \dots, N$
- 2 Subtract each measurement,  $X_i$ , from the  $DCGL_w$  to obtain the differences  
 $D_i = DCGL_w - X_i$ ,  $i = 1, 2, 3, \dots, N$
- 3 Discard each difference that is exactly zero and reduce the sample size,  $N$ , by the number of such zero measurements
- 4 Count the number of positive differences. The result is the test statistic  $S^+$ . Note that a positive difference corresponds to a measurement result below the  $DCGL_w$  and contributes evidence that the survey unit meets the release criterion
- 5 Large values of  $S^+$  indicate that the null hypothesis (that the survey unit exceeds the release criterion) is false. The value of  $S^+$  is compared to the critical values in Table I 3 of the MARSSIM. If the  $S^+$  is greater than the critical value,  $k$ , in that table, the null hypothesis is rejected

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**APPENDIX 4**

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**PACKAGE CONTENT SHEET**

<u>Required Forms</u>	<u>Number of Pages</u>
Survey Unit Breakdown Form	1
Survey Package Cover Sheet	1
Survey Package Correction/Change History Form	1
Survey Package Survey/Sampling Instructions Form	2
Survey Package Calculation Worksheet	1
Total Surface Activity Data Sheet	2
Removable Activity Data Sheet	1
Instrument Data Sheet	1
Survey Signature Sheet	1
Surface Media Data Form	1
Survey Map	1
Other documents	

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